INTEGRATED LOGISTICS SUPPORT (ILS) OVERVIEW; by Chuck Sproull 7/97

1. This briefing consists of two parts. The first part includes some personal background and reasons why I am a Logistics Management Specialist, the definitions of ILS and the basic support elements. The second part shows how ILS fits into the big picture of program or corporate management and describes some logistics management tools. Much of this is from a military point of view, but the concepts and elements of support and readiness apply to commercial industry as well. My hope to give managers, engineers and technical personnel a clearer understanding support concepts and a deeper appreciation of the wide world of logistics. During this 2 hour briefing you will be exposed to some of the thinking process that goes on in the minds of logisticians, some terms loggies use in planning for support, and some basic logistics engineering math.

BRIEFING OUTLINE [1]

INTEGRATED LOGISTICS SUPPORT

- **PURPOSE AND INTRODUCTION** (Paragraph 1-4)
- **DEFINITIONS OF ILS AND ELEMENTS** (5-28)
- **ILS PLAN AND RELATED PROGRAMS** (29-37)
- **ILS REQUIREMENTS, PROGRAM MGMT** (38-46)
- **SYSTEM DEVELOPMENT AND SUPPORT** (47-50)
- **AUTOMATED PLANNING AND SUPPORT** (51-53)
- **SOLE / LEF, PROFESSIONAL ORGANIZATIONS** (54)
- **SUMMARY AND CONCLUSIONS** (55-57)

This is not an in-depth technical presentation. For the sake of time, this is an elementary but very broad view of ILS and management. If you are interested in a deeper understanding, there are 1-2 week classes available for each of the logistics support elements. There are many success and failure stories or "lessons learned" that could be told about each element.

Note for my Crane/DoD co-workers: If you know more about any of these subjects than what is presented here, that's good. This presentation is directed to people whose work may involve one of more aspects of support (like the majority of us here), but who don't have a wide exposure to logistics support concepts, to help them view the broad scope of ILS. If you know more about the overall subject of ILS, and you think this method of presentation is good, I would encourage you to put your own briefing together for a video presentation of ILS from your point of view, or of any other subject important to Crane operations. If you do, I will be just as interested in your point of view as I hope you are in mine. Also, there are two kinds of criticism. Anyone can give cheap criticism. But, expensive criticism costs the critic more time and effort, and adds more value to the one receiving it.

First, some personal notes. I graduated from Muskingum College, New Concord Ohio in 1964 with a BS degree in geology, minor in math, and background in chemistry, physics, oceanography and the arts. I began my Navy career as a Sonar Technician, attending Sonar School in Key West for 6 months, then was stationed in Norfolk Naval Base where I gained experience operating and maintaining SQS-4 Sonar on the USS Henley DD762, a reserve destroyer. After 2 years active duty I went back to school with financial assistance from the GI bill, and attended Virginia Institute of Marine Science, Glouchester Point (across the river from Yorktown). This is an extension of William and Mary College. There I studied four interrelated areas of oceanography - geological, physical, chemical and biological.

After a year, I began working with the Navy Oceanographic Office in Washington DC, as a oceanographer. There I participated for three years in the development of high speed, automated hydrographic charting techniques in support of riverine warfare efforts in Viet Nam, to aid U.S. Navy PT boat navigators find the best channels in the Mekong River. Then I spent 6 years in deep ocean surveys, collecting, processing and publishing bathymetric and ocean data for charting the ocean bottom, identifying water mass shapes and movements, and for sonar system development. Next, I spent three years planning and conducting airborne acoustic surveys, to identify the acoustic properties of the ocean bottom and of water masses, using sonobuoys.

When NAVOCEANO moved to Bay St Louis MS, I stayed in DC and began working with NAVAIRSYSCOM, in PMA264, the Sonobuoy Program Management office as a Program Analyst. This office managed both

the development and production of sonobuoys. It was here, and at the 6 month Program Management Course at Ft Belvoir VA, were I began to learn about the wide variety of subjects that Program Managers are concerned about. The thing I was most fascinated with, however, was logistics support. Concern for sonobuoy users caused me to spend much time helping them find answers to their questions, ways to obtain the units they needed, closing Logistics Review Group (LRG) audit findings and planning for new sonobuoys to be easier to obtain and use.

At that time (early 80's), NSWC Crane (7056) was providing NAVAIR with technical support under vaguely-written AIR TASKS. I defined the ILS elements as they relate to sonobuoys and began writing TASKS for more specific ILS support, and began writing ILS plans for sonobuoys to identify and bring management attention to deficiencies in the existing support environment. I also sought to change my job title to Logistics Management Specialist (LMS). My main concern was for the satisfaction of end users (sailors like I used to be), users of sonobuoys who were on the front lines protecting our national interests, and I felt that in logistics I could give them the best support.

In 1984, I learned about an LMS position opening up in the Sonobuoy Project at Crane and transferred out here to help further develop the sonobuoy ILS program. I also participated in developing the Integrated Quality Program where I learned about user satisfaction from the point of view of quality during production. I have also worked with the Acoustic Device Countermeasures project, ship and submarine sonar transducer project and Mine Countermeasure project. I am currently working in Electronic Countermeasures Project (8024).

CATEGORIES OF LOGISTICS 2
SUBSISTENCE LOGISTICS

- **BASIC NECESSITIES OF LIFE**
- **CONSTANT DEMAND**
- **LITTLE CHANGE OVER TIME**
- **PRINCIPLE ACTIVITY IN PRIMITIVE SOCIETY**
- **CAN'T PREDICT FAILURE**
- **MAIN ELEMENT - AVAILABILITY**
- **ESSENTIAL IN INDUSTRIAL SOCIETY**

2. Where did the idea of logistics support begin? Support is as old as mankind. Can we live without support? Can nations defend themselves without support? The earliest form of logistics is subsistence logistics, or personal, family and village life support. Primitive societies spent most of their time just living and learning how to survive. They needed a constant supply of food and protection from adverse weather and from enemies who tried to steal their support resources. That support required some advanced planning. We're eating basically the same foods we've eaten for thousands of years. We still need a constant supply of food, shelter and clothing. And we still need to protect our basic subsistence from depletion and from selfish enemies. Has anything changed since then? Only the support resources have improved. The main consideration or element in subsistence logistics is availability.

Failures, or the unavailability of subsistence items, were usually caused by natural disasters (fire, wind, rain, famine, earth quakes), by external enemies and by poor internal (home, village or national) management. Regardless of cause, failures

OPERATIONS LOGISTICS 3

- **SYSTEMS THAT PRODUCE: FUEL, UTILITIES, RAW MATERIALS**
  - **BUSINESS**
    - **INCOMING MATERIALS AND OUTGOING PRODUCTS**
  - **MILITARY**
    - **MOVEMENT OF PERSONNEL AND EQUIPMENT**
- **CONSTANT DEMAND**
- **SLOW TO CHANGE OVER TIME**
- **CAN'T PREDICT FAILURES**
- **MAIN ELEMENT - AVAILABILITY**
- **DEPENDS ON HARDWARE LOGISTICS**

are hard to predict, are sometimes catastrophic and reduce the availability of our subsistence. In larger societies like ours, subsistence logistics depends on operations logistics.

3. Where food and other subsistence materials are not locally available, operations logistics provides these to us through industries and operations such as transportation, manufacturing, mining, refining, logging, travel, disposal, medical, construction, defense and various utilities (water, fuels, electric power generation, heating, cooling).

Two sub-categories under operations are business logistics, which deals with plans, transportation, handling and storage of incoming materials and parts, and out going products, and Military operational logistics, which deals with the transportation and movement of military personnel and equipment to and from operational areas, and can include clean-up and disposal of damaged equipment.

Like subsistence, operations have constant demand, experience little change over time, and are vulnerable to the same hard-to-predict failures resulting from natural disasters and war. In more advanced societies, people developed ways to improve the availability of basic needs, and could spend more time advancing. Operations all use equipment and facilities that need maintenance (mostly unplanned or corrective) in order to sustain operations. But operations also fail when the hardware systems and equipment used in these operations fail. These failures are becoming easier to predict ahead of time and to prepare for. Both subsistence and operations logistics depend on hardware logistics.

HARDWARE LOGISTICS 4

- **PLANS *(ARRANGEMENTS)* AND RESOURCES NEEDED TO MAINTAIN OPERATIONS**
- **SUCCEEDING GENERATIONS OF HARDWARE TECHNOLOGY MORE COMPLEX**
- **CHANGES ACCELERATE**
- **DEMAND - WIDE RANGE, RANDOM**
- **MAIN ELEMENTS: AVAILABILITY, MAINTENANCE / REPAIR**
- ***ABSOLUTELY* REQUIRES INTEGRATION AMONG *ALL* ELEMENTS**

SOFTWARE LOGISTICS

- **SUPPORTS HARDWARE LOGISTICS**

SPACE LOGISTICS

- **SUPPORTS SPACE SATELLITE AND TRAVEL OPERATIONS**

FACTORY LOGISTICS

- **SUPPORTS MANUFACTURING**

4. Hardware logistics is the composite of all the plans and resources required to maintain equipment, hardware and facilities, for the purpose of maintaining operations. It is planning ahead for all the things that will happen to a product after production and to support the users while operating and maintaining it. The rest of this briefing is mostly about equipment logistics in a general way, which can apply equally well to hardware, trucks, planes, tanks and cars, appliances, and military defense systems and equipment. The most recent categories of logistics to be defined is Software Logistics which supports hardware logistics, Space logistics which supports launching, recovery and maintenance of space craft and satellites, and Factory logistics which is an enlarged version of hardware logistics in maintenance of entire manufacturing facilities

What are the three most important words in this next sentence? After equipment is manufactured, when it is turned on, if it ready to perform reliably for its intended use in the intended environment, then the user is satisfied with the equipment. The three key words are ready, perform and satisfied. To satisfy their customers, engineers design equipment to perform with high reliability to a set of user requirements. But what about readiness? Without logistics planning and support, the best designed, most reliable, highest performance equipment would just sit on the manufacturer's loading dock. If it were crated and transported to the user location, how would they know how to operate it? If the users did figure out how to operate it, how would they fix it if it failed? Users are most satisfied with things that are always ready to perform when needed.

Equipment performance is important, but performance alone, even high reliable performance, doesn't sustain itself nor finish the job. Performance can fire the first shot and hit the target, but logistics planning and support makes sure the weapon system is always ready when needed, sustains the supply of ammunition, and wins the war. In a more general sense, performance starts satisfying user requirements, but logistics (readiness and support) is what sustains that performance and wins in the long run. Study history and ask Hannibal, Napoleon and Davy Crockett which is more important, performance or logistics support.

Fifty to 100 years ago, design engineering may have been a lot easier. Perhaps it was feasible for engineers to plan ahead for logistics support. But, succeeding generations of commercial and military hardware technology have become so complex that today it would be difficult for one engineer to design all the required performance and support characteristics into a system, and plan for all the required support resources. It is possible to design mechanical and electronic equipment so ruggedly that it may never fail, but their cost would be astronomical. So we compromise by using parts and materials we can afford, but which have a lower reliability; and this requires more time and money be spent on planning for support.

Over a period of about 35 years (1940's - mid 1970's), DoD analysts noticed that some systems, after being manufactured and delivered to the users, couldn't be operated or maintained as well as planned; or for certain reasons they couldn't fulfill their intended mission. They listed the causes of fielded equipment failure and summarized them into categories. Some failures were due to low reliability, insufficient funding, inadequate testing, poor program management, scheduling problems, and support-related problems. These support-related problems were divided up into ten sub-categories which we now refer to as the ten elements of integrated logistics support. The driving elements of hardware logistics support are availability, maintenance and repair. In order for these to be provided effectively to the end user of the equipment, they must be included in the design engineering process, and integrated (or coordinated) together during development.

Planning for fulfillment of all the performance and support requirements of a complex weapon system or commercial equipment is beyond the ability of an engineer or a logistics specialist; there needs to be close cooperation between engineering and logistics in order to consider everything. This need lead to the development of the Logistics Management Specialist job series in the U.S. Department of Defense (DoD), Logistics Engineers in defense industry and Logistics Element Managers to specialize in each major technical category of ILS.

Next we will examine some definitions of Integrated Logistics Support, the Elements of Hardware Logistics, an ILS Plan Outline, and the Requirements for ILS programs.